Generator Notes

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Stenoscop Generator Info

Part Numbers:

- Visiplex Covers;
- 830806P013 when Visiplex present
- 830806P014 when Visiplex absent
- Shipping rod Null-modem serial cable for laptop connection to MDA = 2128821 (same as used on Advantx-E)
- Special tweeker for CCD camera = CG2109925
- Shipping rod for vertical column = CG823697P015
- CCD Extender board = 2106275
- Generator extender board = CG817596G015
- Cal Sphere (DX/DLX) CG91727479

Fluoro Tone:

To enable fluoro tone, do the following. On board 3A12, move the jumper W231 to position W230. Note: jumper 231 is not present on schema (101-110).

Power up problems: Steno D6

Operator presses the turn on switch 9Sm1 on the Stenoscop Cart
Line voltage goes thru 9R1 to
terminal 8 of 9TR1
9F2 1A fuse
9PL1 plug pins 32 and 33
a time delay (M)
9K2 A2
9K2 A1
9F1
terminal 6 of 9TR1
110VAC is applied to 9K1 contactor and it energizes

TURN OFF SEQUENCE:
1) Operator presses the turn off switch 9Sm1 on the Stenoscop Cart
2) Operator presses the turn off switch on the Stenoscop C-arm control panel
3A3 Q152 turns on (schematic 117D)
9A1 K3 relay pulls in
110VAC is applied to the coil of 9Sm1, which opens up the line power

POSSIBLE PROBLEMS:

1) Any bad connection in the 9K1 circuit described above will cause 9K1 to drop out.

Bad fuse(s) or fuse holder(s)
Bad connection in 9PL1 pins 32 and 33
Bad time delay
Bad relay 9K1 itself
Bad connections on transformer 9TR1

2) Any short in the 9A1 K3 circuit
Shorted wiring (insulation worn away)
Leaky transistor 3A3 Q152
Flaky components on the 3A3 board
Check G163D for any unused gates.
If any unused input pins are left floating, it could cause pin 11 to turn on Q152
Unused input pins should be tied to 0V.

3) Any short in the 9A4 K5 circuit
If 9K1 contacts 21 and 22 short, 9A4 K5 pulls in and drops out 9K1
Shorted wiring (insulation worn away)

4) Defective 9Sm1

5) Line voltage drops too low or drops out (reclosure)
Not knowing how tolerant the Stenoscop is of line abnormalities, I would do this:
Scope 9TR1 pins 8 and 6 (floating 110vac)
wiggle the 110vac wall plug, trying to generate a "dropout" condition.
observe on the scope how many cycles are lost before it turns off

6) Bad connection in the line plug

7) Bad connection in the hospital wiring (wall plug, circuit breaker, etc.)
Scope the current of 9TR1 using a clamp on ammeter
Make fluoro and rad exposures and record current values
Scope the output voltage of 9TR1 pins 9 andf 12 (floating 275VAC)
Make fluoro and Rad exposures and record line loss.
Repeat using different 110VAC outlets in the hospital
Find out if the wiring is 12ga (20A) or 14ga (15A)
It would be interesting to find a 20A line and try it there.

8) Weak 9TR1 transformer

9) X-ray tube spit
Scope mA and look for instability at high fluoro kV.

10) x-ray inverter problem
verify ALL connections are tight

Generator calibration steering guide.

Perform following Job Cards:

- RG202 kV Circuit measure with Keithley.
- RG203 Travel Safety (Inverter SCR cross-fire safety).
- RG204 Fluoro mA Adjustment.
- RG205 Fluoro preheating (fluoro filament boost).
- RG206 Fluoro Timer.
- RG207 Rad Safety (backup timer if exceed 160 mAs limit).
- RG208 Rad mA (filament boost RAD).
- RG209 Filament switching.
- RG210 MAS Integrator cal.

Collimation: **1st set of blades** = lead (Pb), "opaque"
2nd set of blades = Aluminum radio-translucent. Allows collimation to control image brightness AND see surgical hardware in the periphery, especially if it is being inserted.
Circular lead apertures switch in automatically for 9" and 6" FOV which limit x-ray to edge of I.I.

Image intensifier = F1, HP or HX (MDA). 6" or 9" (dual FOV)

ER = Electronic radiography (Single-pulse FLUORO) : X-ray is maintained long enough for ABC to stabilize and then the exposure is halted – even if you just "tap" the foot-switch. Not using this mode and "tapping the ft. switch can lead to inconsistent image brightness.

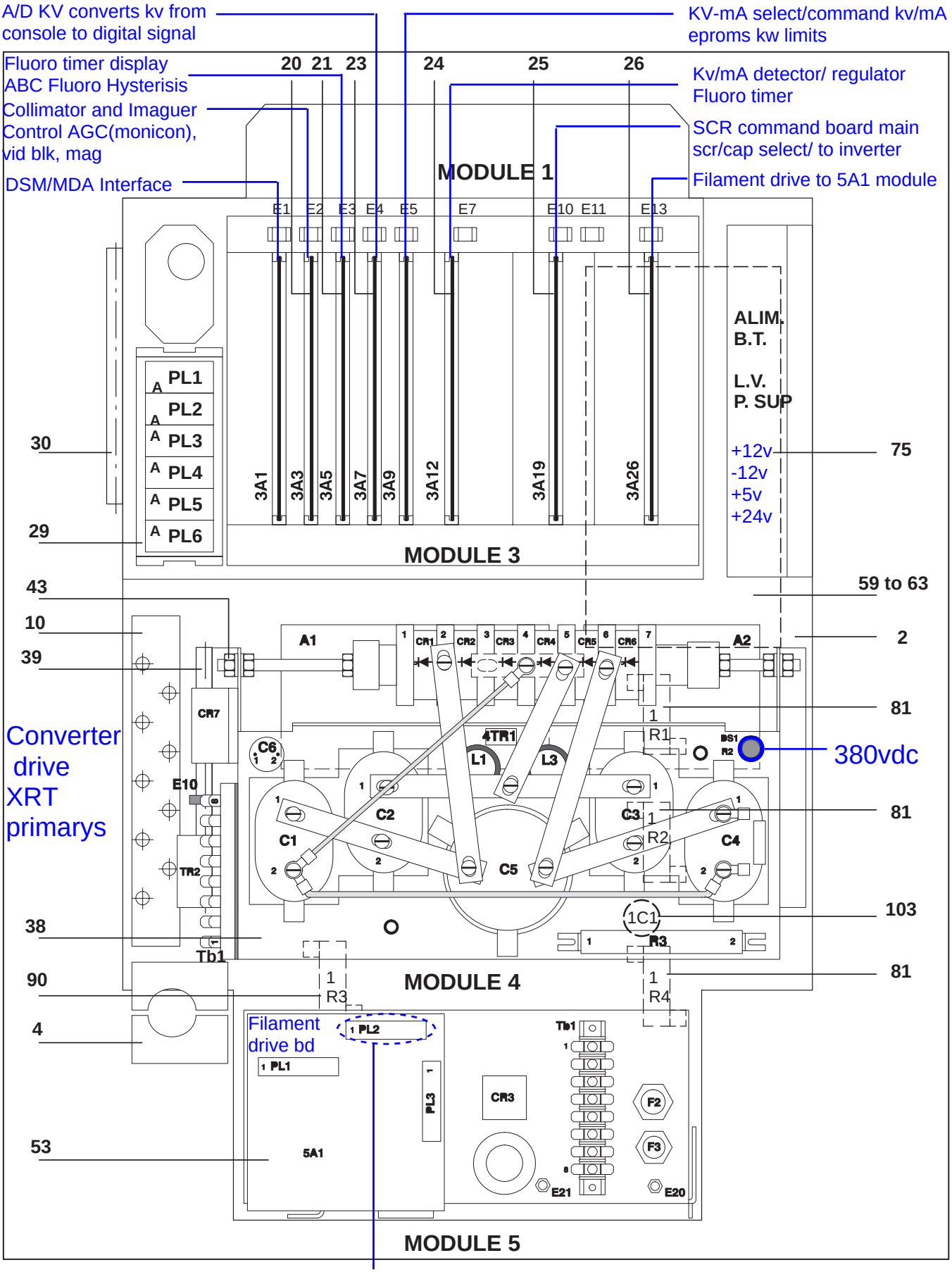
SC (scopie pulsed) = Pulsed Fluoro: not what you think! Operates as a series of ER exposures. 1 Fluoro pulsed exposure every 1.5 seconds.

Vertical c-arm drive: driven by motorized metal drum assembly that slips when an obstruction/limit is reached – no limit switches.

If it drives down but not up you may have a bad gas shock (counterpoise).

If can't drive down then vertical safety may be tripped. This too can be caused by a bad gas schock.

Stenoscop 2 Generator Rack



Troubleshooting

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SYSTEM TROUBLE SHOOTING

PROBLEMS IN THE SYSTEM	***PROBABLE CAUSES***	***ACTIONS RECOMMENDED***
1. Exposure not coming in the fluoroscopy mode.	• Some PCB's may be loose in the Card Rack	• Remove all the PCB's and insert them properly again.
	• Transpanel connections	• Refer to SM section 3.7 • Check the Transpanel connections.
	• BNC Connector loose connections	• Check the BNC connector coming from the Imager to the Buggy and from the buggy to the 9PL1 PCB.
	• Memory or Imager	• Take out 3A1 PCB. • Make switch S 76 1 – 8 (A) in ON position. Give exposures. • If exposure present problem with memory or imager. • Refer to the respective Diagnostics.
	• SMPS	• Refer to SM –Schematics - A3 - Panel 5- Module 5- Low Voltages block. • Check the following voltages on the SMPS :- - Pts. 7&8 +12V - Pts. 9&10 -12V - Pts.1&5 +5V • If the voltages are not OK replace the SMPS. • Check for the following voltages on 3A26 PCB :- - a1 +12V - a2 +5V - a4 -12V
	• 3A12 PCB	• If problem still persists change 3A12 PCB.
	• Tube Head	• If the problem still persists change the Tube Head.

2. Image very bright when exposure given but afterwards turns dull. 3. Image grainy at FNR 0. 4. More MA required for good image quality.	• 3A26 PCB	• Refer to SM job card RG 205 for the following adjustment. • Check pot R3 on PCB 3A26.
5. High kV and MA values required for good image quality. 6. Unit operating only in the Manual mode, Auto mode not working.	• 3A5 PCB	• Refer to SM job card RG 211 – 4.1 &4.2 for the following adjustment. • Check pot R60 for 2.1V on 3A5 PCB. • Refer to SM job card RG 211 – "Phase adjustment" for the following adjustment. • If 2.1V is not present then adjust pot R60 on 3A5 PCB. • Also refer to ASM "Imager Trouble Shooting Guide" for high kV
	• 3A12 PCB	• Check voltage between TPE8 and TPE7. • It should be 54.2 V at 110kV, if not then adjust pot R216. • Refer to SM job card RG 202 for the above adjustment. • If problem still persists replace 3A12 PCB.
7. If kV is out of Specs.	• 3A12 PCB	• Check voltage between TPE8 and TPE7. • It should be 54.2 volts at 110 kV, if not adjust pot R216. • Refer to SM job card RG 202 for the following adjustment. • If problem still persists replace 3A12 PCB.
8. Fluoro MA out of specs.	• 3A26 PCB	• Refer to SM job card RG 206 for the following adjustment. • Adjust pot R9 on 3A26 PCB RG 204

9. Rad Mas out of Specs.	• 3A26 PCB	• Adjust pot R5 and R6. • Refer to SM job Card RG 210 for this Adjustment. • If problem not solved replace 3A26. • If problem persists replace 3A9.
10. No exposure cut-off in fluoro mode after 5min.	• 3A12 PCB	• Replace 3A12 PCB.
11. Fluoro timer not working.	• 3A12 PCB	• Refer to SM job card RG 206 for the following adjustment. • Adjust pot R217. • If problem persists replace 3A12 PCB.
12. Back up timer not working.	• 3A26 PCB	• Refer to SM job card RG 207 for the following adjustment.
13. Rad exposure time not proper.	• 3A26 PCB	• Refer to SM job card RG 210 for the following adjustment. • Adjust pot R5 and pot R6 to get the required MAs. • If problem persists replace 3A26 PCB. • If problem still persists replace 3A9 PCB.
14. HV spike in the Tube Head.	• Contamination of oil. • Over heating of the oil. • Spark gap PCB in the Tube Head failed.	• Replace Tube Head.
15. If at 110kV MA exceeds 3.9 ma (Interlock not working)	• 3A9 PCB	• Change 3A9 PCB.
16. Filament not glowing. 17. Filament not heating.	• 3A5 PCB • 3A26 PCB	• Replace 3A5 PCB. • If problem still persists replace 3A26 PCB. • If problem not solved replace Tube Head.
18. Dose out of Specs.	• 3A5 PCB.	• Refer to SM job card RG 211 – 4.4 “Phase Adjustment” and 4.5 “Hysteresis Adjustment” • Adjust pot R60 on 3A5 PCB.

	• Imager	• Refer to SM job Card 251 “Input dose rate adjustment”.
19. X – Rays continue for 1 – 2 sec. even after the x-ray footswitch, handswitch or the x-ray switch on the keyboard is released. (R – X hold fails)	• 3A1 PCB	• Refer to SM job card RG 213 for the switch settings of this PCB. • If problem persists refer to SM job card 212 for waveforms and pot adjustments. • If problem still persists replace 3A1 PCB.
20. Pressure sensor cut off earlier than limit.	• There may be oil leakage from the Tube Head due to which an air bubble may have been introduced.	• Replace the Tube Head
21. Thermal switch cut off earlier than limit.	• Excess heating of the Tube head oil.	• Put off the machine and let the Tube Head cool for some time. • If problem still persists change the Thermal switch. • If problem still persists replace the Tube Head.
22. Fluro & Rad. mode working only upto a certain limit.	• 3A12 PCB	• Check voltage between TPE8 and TPE7. • It should be 54.2 volts at 110 kV, if not adjust pot R216. • Refer to RG 202 of SM. • If problem still persists replace 3A12 PCB.